REMARKS

Claims 1 to 4, 6 to 14 and 16 to 19 are pending. Claim 5 has been amended into Claim 1 and cancelled. Claim 15 was previously cancelled. No claims are allowed.

Claim 1 has been amended to clearly recite that no sugars are added to the processed food between steps (a) and (e). Claim 1 has also been amended to clearly state that the microorganism is removed with the aqueous medium.

Claims 1 to 14 and 16 to 19 were rejected under 35 USC 112, first paragraph, as failing to comply with the written description requirement. Claim 1 has been modified to delete "consisting essentially of" and "comprising" has been substituted.

In Claim 1, the word "dry" has been deleted since it is an unnecessary limitation in Claim 1. Claim 2 has been amended to call for the yeast extract being introduced in dry form into the aqueous medium.

Claim 14 is supported in the specification at page 1, line 24 to page 2, line 2 (paragraph [0002]).

> "In particular, the present invention relates to a method wherein an uncooked starchy food product is treated with fermentative food grade bacteria and/or yeast under controlled pH and temperatures in the presence of growth stimulants comprising yeast extract and neutralizing agents comprising alkali metal hydroxide (Na or K) or food grade acid (citric, lactic, or hydrochloric)".

Claim 1 has been amended to reflect the addition of the agents to the aqueous medium. Reconsideration of this rejection is requested.

Claims 1 to 14 and 15 to 19 were rejected under 35 USC 112, second paragraph as being indefinite. The term "consisting essentially of" in Claim 1 has been changed as discussed above.

The control of pH during fermentation depends on the nature of food being treated. Uncontrolled acidity changes the texture of the foods due to precipitation of some proteins. It is preferred to adjust the pH during fermentation to maintain constant pH levels, especially when testing for the effect of pH on the reduction of acrylamide as discussed in the specification on page 16, Table 9. In the Examples reported in the specification, the fermentation aid (Dry Yeast Extract) and the potatoes used have a low level of reducing sugar (page 10, Table 1); therefore, there was no need to adjust the pH during fermentation, because the variation in pH levels due to the formation of lactic acid from the fermentation reaction did not cause a significant drop in pH that requires intervention. Tight control of the pH can not be achieved by lactic acid bacteria alone, because the fermentation reaction is difficult to control and more or less unpredictable. The Applicant disclosed pH control in the application (page 1, line 24 to

page 2, line 2) as previously discussed in connection with the rejection under 35 USC 112, first paragraph.

Claims 1 to 10, 13 and 17 to 19 were rejected under 35 USC 103(a) as being unpatentable over Hilton et al. (U.S. Patent No. 4,140,801) in view of Levy (U.S. Patent No. 4,568,643) and Yeast Growth Medium.

In general, lowering the amount of reducing sugars eliminates the after cook browning (Maillard reaction). However, lowering the amount of reducing sugars (acrylamide precursors) by fermentation or other means does not automatically mean inhibition of acrylamide formation for the following reasons:

1. It is important to have a low sugar level in the final treated product right before cooking as a result of the fermenting and washing as now set forth in Claim 1. The Office Action stated that Hilton et al. reported the reduction of the amount of reducing sugars by fermentation to less than about 0.2 weight percent (Column 3, lines 43-60). In addition, Hilton teaches:

> "Among the materials which may be added to the mixture to be formed, are, for example, starch containing ingredients such as rice, tapioca, potato or wheat flour or starches, antioxidants or other additives, and the solids are preferably composed to a major extent of potato solids (Column 6, lines 7-12)".

The addition of the materials suggested by Hilton et al. took place after the fermentation was accomplished. These materials were not subjected to the fermentation process, and since these materials are rich in acrylamide precursors, the amino acid asparagine and sugars, therefore, lead to increased formation of acrylamide in the end product during cooking. In contrast, the Applicant added 0.5% Dry Yeast Extract (a fermentation aid that is free of the amino acid asparagine and has a negligible amount of sugars (<<0.04%), before the onset of the fermentation to support the initial growth and activities of the fermenting microorganisms. The prior Office Action mailed June 14, 2006, stated:

> "The addition of the second source of potato (Column 2, lines 60-63) or the other starch-containing materials (Column 6, lines 7-12) inherently provides both a source of added sugar and amino acids, thus meeting instant Claims 2-3."

The Applicant used the entire fermented product for frying or baking, without addition of any unfermented materials after the fermentation was accomplished, to keep the acrylamide precursor levels low so that the acrylamide formation in the end products will be significantly reduced during cooking. Claim 1 has been amended to clearly state that no sugars are added during or after the fermentation, as disclosed in the application at paragraphs [0017] and [0018] on page 7. The process described by Hilton et al. is not capable of performing

the process of the claimed invention because it promotes the formation of acrylamide.

2. In the claimed invention, the Applicant preferably has a pH adjusting step prior to the onset of the fermentation, and when necessary, depending on the type of food being treated, during the fermentation. The effect of pH on the reduction of acrylamide is discussed in the specification at page 16, Table 9. At pH 4, the amount of mono- and disaccharides was <0.1% and the observed acrylamide reduction was 81%. At pH 7, the amount of mono- and disaccharides was <0.1% and the observed acrylamide reduction was 45%. Surprisingly, at lower pH between about 4 and 5, the acrylamide reduction was much higher than the ones observed at an optimal pH (6 or 7) for microbial growth. The higher acrylamide reduction at pH 4 indicates that a low pH has an effect on the acrylamide reduction along with microbial fermentation, regardless of the amount of reducing sugars. This pH limitation is in Claim 16 and is disclosed on page 6, paragraph [0012] of the application.

In view of the prior art cited, it would not have been obvious to one having ordinary skill in the art at the time of the invention to have employed acid pH levels as in Claim 16 in conjunction with removal of acrylamide precursors

by microbial fermentation in the processes of the cited art and motivation for doing so is simply not suggested.

At page 7 of the Office Action, line 13 to page 8, line 6, it is stated that:

> "Yeast Growth Medium teaches that yeast extract is a natural growth medium for *Saccharomyces* yeasts. To the ordinarily skilled artisan, *Saccharomyces* yeasts are also known as baker's yeasts, or those yeasts that are used in making food products and fermenting sugar. In addition, it would have been obvious to one having ordinary skill in the art that growth mediums further support the growth of the yeast. Thus, additional yeast in a fermentation vessel would have increased fermentation by increasing the amount of the yeast organism within the fermentation process. It would have been known to the ordinarily skilled artisan that the yeast extract contains nutrients that promote the growth of yeast, such as amino acids.
>
> Therefore, it would have been obvious to one having ordinary skill in the art that to use a growth medium such as yeast extract would have aided in increasing the growth of the yeast microorganism, thus increasing the ability to ferment the potatoes for achieving the reducing sugar levels desired by Hilton et al. The yeast extract would have provided the nutrient rich environment that yeast requires for growth."

"Yeast Growth Medium" used by the Examiner is not a peer reviewed reference, a patent or even an experiment, it is an internet conversation between Steve Quest who posted a question on the internet looking for an ideal growth medium for *Saccharomyces* yeasts and the responder, Mann Alan Leslie. During the internet exchange, Mann Alan Leslie suggested the growth mediums "YPD (1% Difco Bacto Yeast Extract, 2% Difco

Bacto Peptone, 2% dextrose (i.e. glucose) as non selective medium and SD (0.67% Batco Yeast Nitrogen Base, 2% dextrose (i.e. glucose) and necessary auxotrophic supplements (depending on the strain) as selective." Steve responded: "These SOUND like natural growth mediums". Based on the information exchanged, it is not known whether any of these media have any synthetic component in it. In fact, even Steve himself did not know whether the medium is synthetic or natural, he said: "sounds like." Unfortunately, the Office Action in the rejection took this statement out of context and determined that:

> "Yeast Growth Medium teaches that yeast extract is a natural growth medium."

Scientific conclusions must be based on solid facts and reliable data; otherwise, they're unacceptable in the scientific community. Anyway, assuming this could be used as prior art, the internet conversation entitled "Yeast Growth Medium" is recommending the addition of dextrose (glucose), an acrylamide precursor, which will increase the formation of acrylamide. There is growth medium and in contrast to what the Applicant is teaching and claiming and, therefore can not be used in his process as presently claimed in independent Claim 1. Moreover, this internet conversation does not even remotely

suggest that the dry yeast extract used without added sugar by the Applicant can be used as a growth medium.

In reference to page 8, line 19 to page 9, line 10 of the Office Action, the Office Action cited the Hilton et al. abstract which states:

> "the potatoes which are fermented before dehydration exhibit a good rate of reducing sugar decline during fermentation, and may have a less yeasty or fermentation taste upon frying than potatoes which are fermented after drying to a low moisture level."

Hilton et al. is not comparing the potatoes which were fermented before dehydration to yeast or bacteria free potato slices, such as the potato slices produced using Applicant's process. The comparison was rather with potatoes which are fermented after drying to a low moisture level. The taste of yeast free potato slices such as the ones Applicant's are producing are far superior to Hilton et al.'s for the simple fact that they do not have remaining yeast, unlike Hilton et al. Moreover, the Office Action stated :

> "Thus in order to ensure less yeasty fermentation taste upon frying, it would have been obvious to one having ordinary skill in the art to have washed the yeast fermented potato pieces with water prior to drying and frying."

The process used by Hilton et al. will not allow a washing step, because he is using blanched mashed potatoes. In Example I, Hilton et al. teaches:

> "The slices were blanched by contact with steam in a chamber maintained at atmospheric pressure for 20 minutes. The blanched potato slices were water-washed to remove excess free starch from the surfaces of the slices, and they were then mashed in a Hobart meat grinder having a grinding plate with orifices 3/16 inch in diameter."

The starting material used by Hilton et al. in all the Examples (Example I to V) was blanched mashed potatoes, which was subsequently fermented with baker's yeast and dried to 48% solids content. The process described by Hilton et al. is not capable of performing the intended use of the claimed invention.

Claim 1 has been amended to call for the microorganism being removed with the aqueous medium after the fermentation as discussed above. This avoids the Levy reference.

Levy teaches that the substrate (which is molasses or the like in water), butanol, excess sugars and other solvents (water) leave the fermentation reactor to the extraction unit back to the fermentation tank after the butanol is being extracted with extraction solvent 47 (Column 4, lines 55-62). The substrate is exiting the fermentation medium through the membranes and porous surfaces (Column 3, lines 2-4; Column 11, lines 27-34 and lines 43-48) and just the bacteria are retained in the space between pipe 18 and membrane wall (Column 4, lines 40-43). In contrast, the Applicant teaches

that the substrate is retained and the medium and fermenting microorganisms are exiting through an outlet (strainer). Levy's reactor is not capable of performing the process of the claimed invention. There is no reasonable chance of success. Claim 1 has been amended to clearly reflect that the microorganisms with the medium are removed in step (c).

At page 11, lines 4 to 5 of the Office Action, it is stated that:

> "On column 4, lines 40-43, Levy states that the liquid, and not the solid substrate, passes through the membrane."

The Office Action has misconstrued the reference. In fact, this is not what Levy taught. Levy said that the liquid, and not the bacteria, passes through the membrane. He never remotely suggested, silently or explicitly, that the substrate was retained by the membrane because this is contrary to the teaching of his invention. Levy taught in column 4, lines 40-43:

> "The filter action of filter medium 23 prevents the bacteria in the culture from passing through and retain them in the space between pipe 18 and membrane wall 22."

The Office Action states at page 11, lines 8 to 15, that:

> "Levy teaches avoiding a solution of the extracting solvent with substrate and culture (Column 3, lines 5-10). An extraction means for preventing substrate and culture in solution during extraction would teach the ordinarily skilled artisan that the culture and the substrate are not part of the fermentation liquor."

In fact, in addition to what the Office Action reported, Levy taught in Column 3, lines 5-10 ". . . . avoiding the formation of a solution of the solvent with substrate, culture, and water,.." Thus, it was not reported that there was water in addition to substrate and culture present. Levy was quoted out of context and the rejection is built on the theory (an extraction means for preventing substrate and culture in solution during extraction would teach the ordinarily skilled artisan that the culture and the substrate are not part of the fermentation liquor at this point) based on substrate and culture alone excluding water even though water was reported by Levy in Column 3, lines 5-10. Applying the quoted theory based on the substrate, culture, and water as reported by Levy and not just only on substrate and culture alone as selectively reported in the Office Action, would teach using the quoted words, the ordinarily skilled artisan that the culture, the substrate, and water are not part of the fermentation liquor during the extraction, which makes the theory incorrect because water is an essential part of the fermentation liquor.

Claims 11 to 12, 14 and 16 were rejected under 35 USC 103(a) as being unpatentable over Hilton et al. in view of Levy (U.S. Patent No. 4,568,643) and Yeast Growth Medium as applied to Claims 1 to 10, 13 and 17 to 19 above, and in further view of Erway (U.S. Patent No. 5,750,165) and Baldwin (U.S. Patent No. 2,744,017). Contrary to the statements in the Office Action, there is nowhere in the Hilton et al. patent, whether silent or explicit, a remote suggestion for the use of yeast extract, use of microorganisms, or a pH adjusting step, or recirculating the fermentation medium. In Example I, Hilton et al. teaches:

> "The slices were blanched by contact with steam in a chamber maintained at atmospheric pressure for 20 minutes. The blanched potato slices were water-washed to remove excess free starch from the surfaces of the slices, and they were then mashed in a Hobart meat grinder having a grinding plate with orifices 3/16 inch in diameter."

The starting material used by Hilton et al. in all the Examples (Example I to V) was blanched mashed potatoes, which was subsequently fermented with <u>baker's yeast</u> and dried to 48% solids content.

Erway teaches blanching potatoes with 0.5 to 0.7% acid solution (glucono delta-lactone) using the time and temperature parameters that are commonly known to the industry: 15-20 minutes and 165°F-190°F, respectively. The acid blanching step is followed by cooling, seeding with lactic acid

bacteria, weighing and packaging (Column 7, line 47 to Column 8, line 17). According to Erway, blanching potatoes with an acid solution was known in the art (Column 2, line 65 to Column 3, line 2). The process described by Erway is not capable of performing the intended use of the claimed invention. The two (2) inventions are not related. The fermentation medium and parameters, the materials being treated, process mechanics and products are completely different and require different treatments and apparatus. For example, in addition to the microorganisms and potatoes, the Applicant's fermentation medium comprised water, a pH agent, and Yeast Extract. Erway did not remotely suggest, silently or explicitly, the use of these items; he just used acid blanched potatoes, which was known in the prior art at the time of his invention, and lactic acid bacteria. Unlike the Applicant, Erway's acid blanched potatoes were directly seeded with lactic acid bacteria using a vibrating shaker (Column 8, lines 5-15) and packaged. The Applicant's fermentation apparatus, described in Figures 2 and 3, preferably is a mixing tank equipped with a mixer or a pump. In the preferred process claimed, the fermentation medium, including the fermenting microorganisms, is circulated in and out of the reactor in a loop form using a pump while the substrate (fresh potato slices) remain in the reactor (Figures 1 and 2). After the completion of the fermentation, the fresh

fermented potato slices are washed with water before cooking to remove any residual leftover from the fermentation medium including the fermenting microorganisms that can negatively affect the flavor.

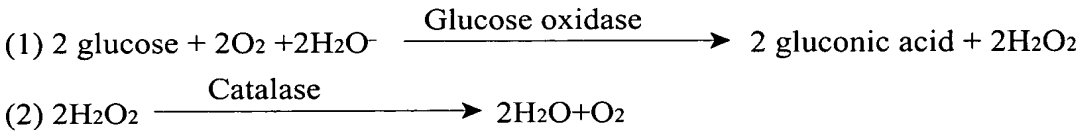
In reference to page 13, lines 8 to 16 of the Office Action, lowering the reducing sugar content of the fermented food does not necessarily mean inhibition of acrylamide formation during cooking. In fact, as discussed above, the Applicant found that the pH has an important role in reducing acrylamide levels, in addition to the removal of reducing sugar. Baldwin, Hilton et al. and Levy did not use a fermentation aid such as the dry yeast extract as used by the Applicant. The fermenting microorganisms, the materials being treated, the process mechanics and the products are completely different and require different treatments and apparatus than the Applicant's. Moreover, Baldwin did not use microorganisms in his process; he used enzymes such as glucose oxidase.

In reference to page 13, lines 16 to 19 of the Office Action, the Office Action stated that Baldwin on column 1, lines 15 to 22, teaches that fermentation using lactic acid bacteria would have improved the quality and storage properties of the food.

Again, the Office Action has misconstrued the reference. In fact, contrary to what the Office Action is stating, Baldwin teaches on Column 1, lines 15-22 that:

> "This invention relates to an enzymatic process and the product formed by the process. The invention has particular usefulness in the preparation of certain food products in order to improve their quality and storage properties. The invention is particularly useful in the preparation of dehydrated egg products, but it also finds use in the using of other foods, such as potatoes, coconut, cereals and the like."

Baldwin on Column 1, lines 15-22 is reporting the benefits of his enzymatic process and not the benefit of lactic acid bacteria as stated by the Examiner. In fact, unlike what is stated in the Office Action, Baldwin teaches against the use of fermentation by lactic acid or yeast due to the several disadvantages associated with it (Column 1, line 64 to Column 2, line 44). Baldwin's invention is based on the use of glucose oxidase in the presence of oxygen to convert glucose to gluconic acid, and decomposition of hydrogen peroxide by the catalase enzyme in accordance with the following reactions (Column 3, lines 19-50):



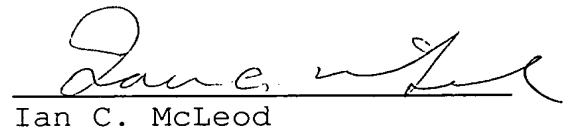
In reference to page 14, line 14 to page 15, line 8 of the Office Action, control of the pH can not be achieved by lactic acid bacteria alone, because the fermentation reaction is difficult to control and more or less unpredictable depending on the availability and nature of substrate, bacterial population and experimental conditions. In the examples reported in the specification, the Applicant used 0.5% Dry Yeast Extract as a fermentation ingredient, before the onset of the fermentation to support the initial growth and activities of the fermenting microorganisms. The Dry Yeast Extract, which is the water soluble component of the yeast cell, is mainly protein and lacks the acrylamide precursor asparagine, and contributes only a negliable amount of carbohydrate (0.03 to 0.06%, an average of 0.04%) to the fermentation medium at the 0.5% usage level reported by the Applicant. That small amounts of carbohydrate (0.04%) consists of starch, fiber, and sugars; therefore, the amount of sugars coming from the Dry Yeast Extract (0.5%) is even way less than 0.04%. Moreover, the potato used to prepare the potato slices (page 10, Table 1) has a low level of reducing sugars, which is the snack industry standard. Therefore, due to the limited availability of substrate, the formation of lactic acid from the fermentation reaction did not cause a significant drop in pH from the original value that was fixed before the onset of

the fermentation. In fact, preferably there was no need to adjust the pH during fermentation to its original value that was set before the onset of the fermentation in the preferred process. Consequently, the pH range used by the Applicant that extends from 4 to 8 can not be obtained from lactic acid bacteria alone, as the Office Action is suggesting, but with a pH adjusting agent as discovered by the Applicant. The higher acrylamide reduction at pH 4 to 5 (Claim 16) indicates that a low pH has effect on the acrylamide reduction along with microbial fermentation, regardless of the amount of reducing sugars.

In view of the prior art cited, the claimed process would not have been obvious to one having ordinary skill in the art at the time the invention was made based upon the cited prior art. Removal of acrylamide precursors by microbial fermentation in the claimed process for doing so is simply not suggested by the prior art.

It is now believed that Claims 1 to 4, 6 to 14 and 16 to 19 are in condition for allowance. Notice of Allowance is requested.

Respectfully,



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